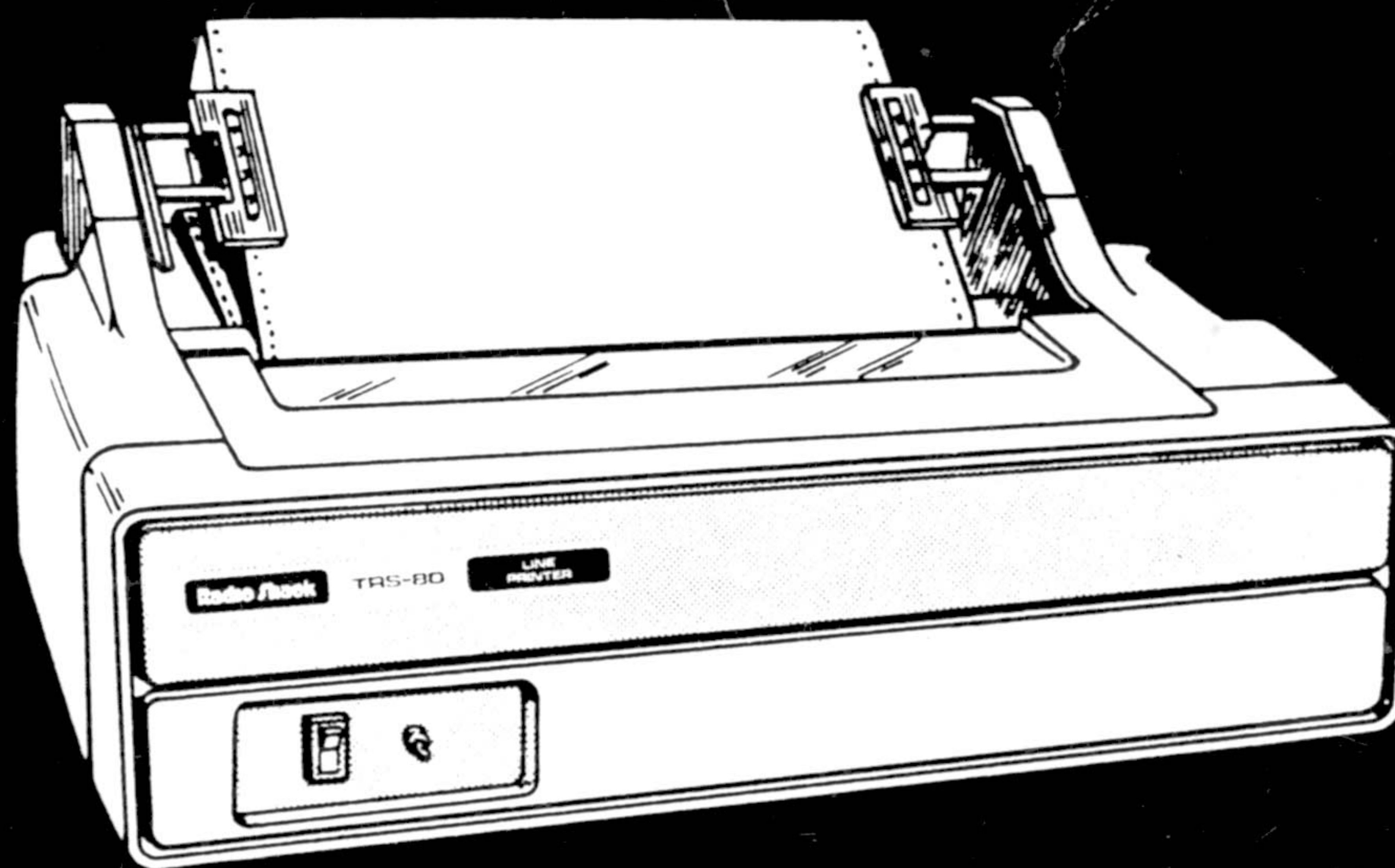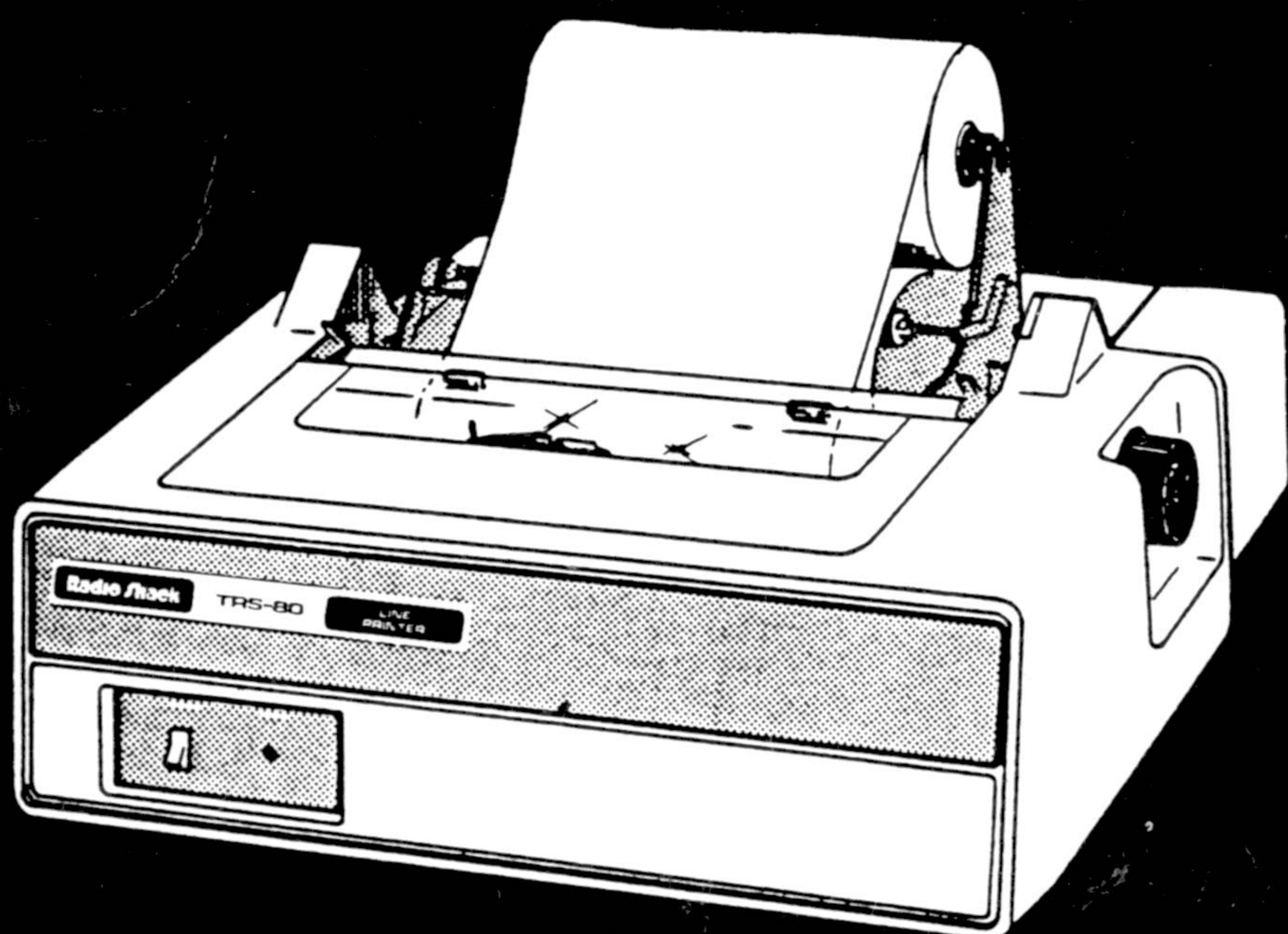# LINE PRINTER

Catalog Numbers 26-1150/26-1152

Radio Shack®
TRS-80 MICRO COMPUTER SYSTEM

HARDWARE

SCOPE

This manual provides installation and operating instructions for the Radio Shack TRS-80 Line Printers (Catalog Numbers 26-1150 and 26-1152). Each Line Printer uses a different paper feed system. The 26-1150 uses a pinch roll paper feed for roll paper and the 26-1152 uses a tractor feed drive for multi-part (fan type) paper. To use a Line Printer with the TRS-80 microcomputer system, you must have the TRS-80 Expansion Interface (26-1140, 26-1141 or 26-1142). You received a telephone type cable (Interface Cable) with your Line Printer. Connect the Interface Cable as illustrated in Figure 1. The manual also includes other information useful to the printer operator.

GENERAL DESCRIPTION

The modular constructed Line Printer is a low speed, unidirectional impact printer. The machine is capable of printing 5 x 7 dot matrix characters at densities of 10 to 16.5 characters per inch (cpi) for line lengths up to eight inches. Because of the fixed print head speed, the print rate increases as the character density is increased. Print rate varies from 60 characters per second (cps) at 10 cpi to 100 characters per second at 16.5 cpi. Vertical line spacing is six lines per inch.

WEIGHT

Printer 45 lbs. (20 Kg)

TEMPERATURE

Operating: 40° to 100° F
4.4° to 37.7° C)
Storage: —40° to 140° F
(—40° to 60° C)

ELECTRICAL REQUIREMENTS

60 Hz, 120 VAC

HUMIDITY

Operating: 20% to 90% (no condensation)
Storage: 5% to 95% (no condensation)

PRINT PERFORMANCE

Table 1 lists the print performance of the printers in lines per minute (lpm) versus character density in characters per inch (cpi) and print speed in characters per second (cps) for a maximum print width of eight inches.

TABLE 1. PRINT PERFORMANCE

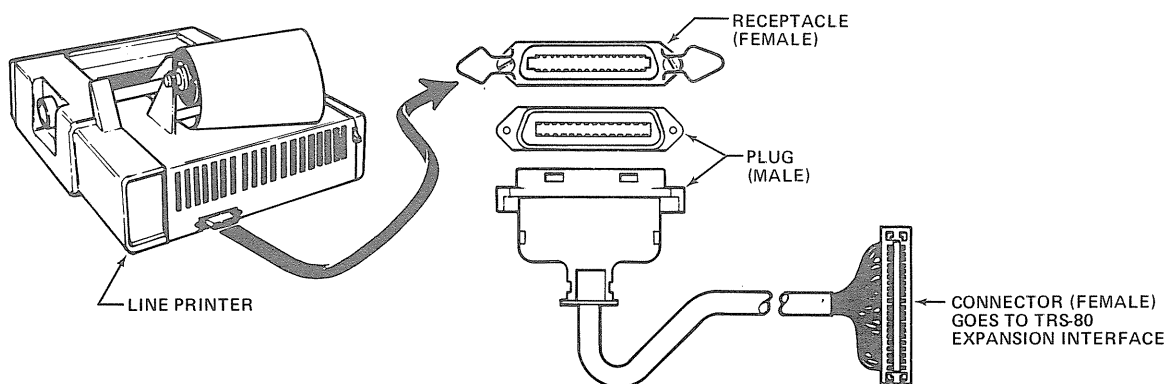| Density (cpi)	Print Speed (cps)	10 Char/ Line (lpm)	80 Char/ Line (lpm)	132 Char/ Line (lpm)
10	60	90	21	N/A
16.5	100	130	36	21

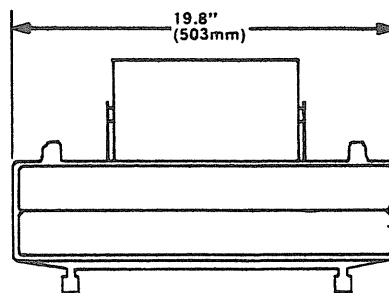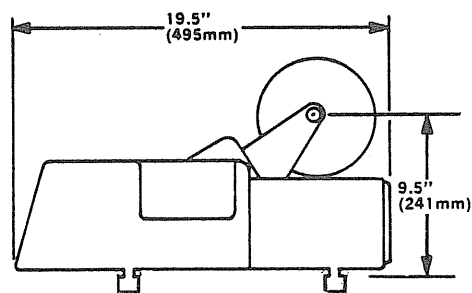FIGURE 1. TRS-80 LINE PRINTER CONNECTION TO TRS-80 EXPANSION INTERFACE

FIGURE 2. PRINTER DIMENSIONS

UNPACKING/REPACKING INSTRUCTIONS

NOTE: FAILURE TO ADHERE TO THE FOLLOWING INSTRUCTIONS COULD RESULT IN VOIDING THE WARRANTY.

RECOMMENDED TOOLS

Flat Blade Screwdriver
Tinsnips

UNPACKING

1. Using tinsnips cut the three bands (1) around the outer sleeve (2) and remove the outer sleeve.

2. Remove the top cover (3) and two sleeves (4, 5).

   NOTE: ATTACHED TO THE FRONT OF THE INNER SLEEVE IS THE CLEAR PLASTIC COVER (6) AND TO THE BACK OF THE INNER SLEEVE ARE OPERATOR'S AND SERVICE MANUALS (7). REMOVE THESE ITEMS FROM THE INNER SLEEVE.
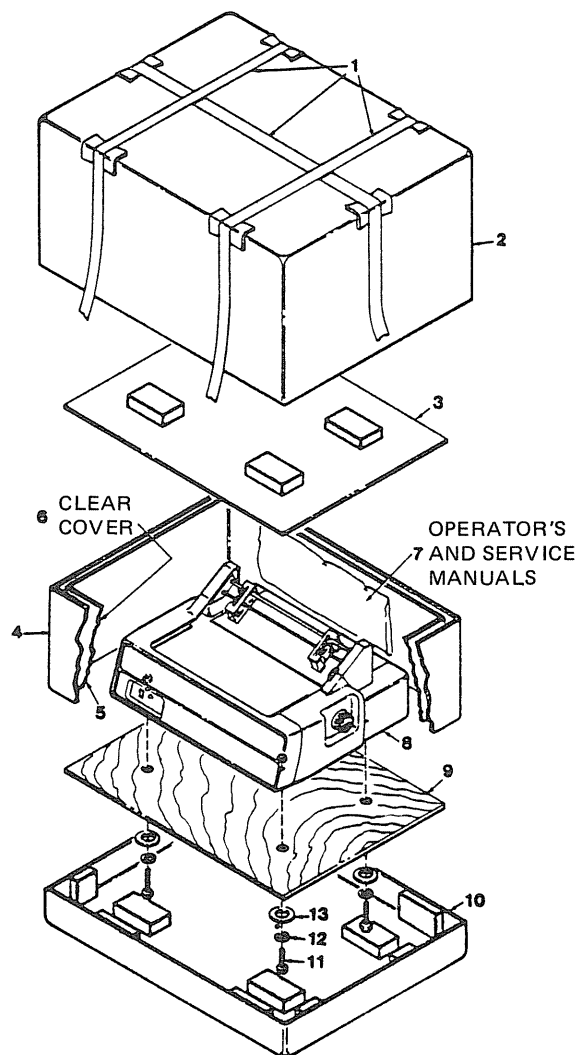
3. Remove the printer (8) and pallet (9) from the bottom cover (10).

4. Remove the hardware (11, 12, 13) mounting the printer to the pallet.

   NOTE: RETAIN MOUNTING HARDWARE FOR RE-PACKING.

5. Unwrap clear plastic cover (6) and install onto printer.

REPACKING

6. To repackage printer, reverse steps 1 through 6 and add new strapping around the outer sleeve.

3

SET-UP PROCEDURES

NOTE: COMPLETE ENTIRE UNPACKING PROCEDURES PRIOR TO PERFORMING THE STEPS LISTED BELOW.

1. Note any discrepancies in general printer appearance.

CAUTION

BEFORE TURNING POWER ON, PERFORM STEPS 2 and 3.

2. Remove the front clear plastic cover from the printer. Loosen (counterclockwise) penetration control knob on right side of carriage and push knob all the way forward. Manually move the print head from left to right and ENSURE CARRIAGE ARMS DO NOT CONTACT THE READY TO PRINT AND END OF PRINT SWITCHES.

3. Loosen and move penetration control knob all the way back (away from platen). If carriage arms do contact switches, refer to the carriage assembly adjustments in the service manual.

4. Insert paper into printer as described in the LOADING PAPER section.

5. Plug printer into appropriate A.C. outlet. ALWAYS USE A 3-WIRE GROUNDED OUTLET.

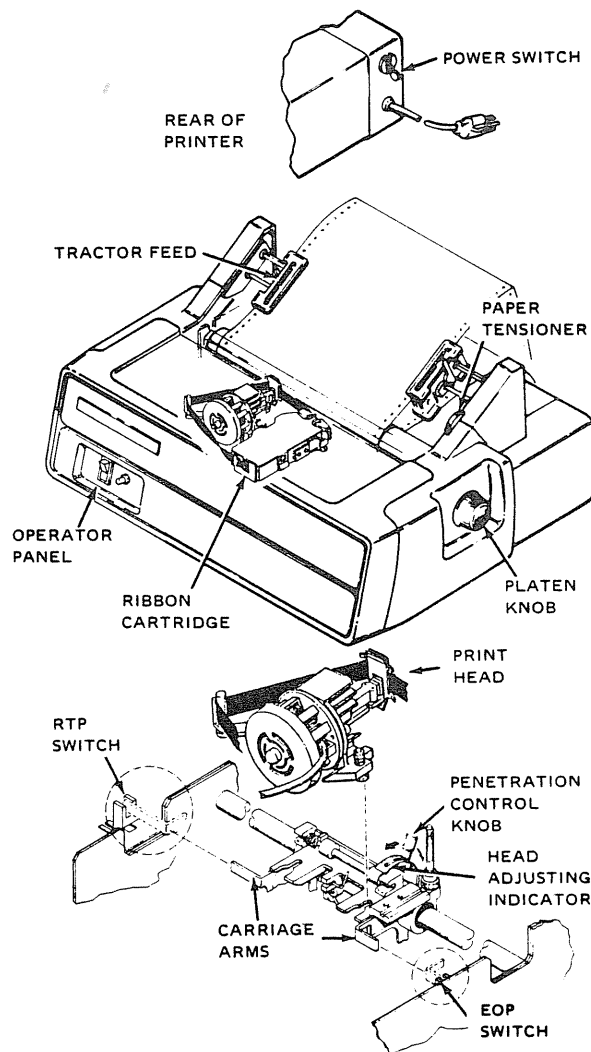6. WITH POWER OFF adjust print head penetration for optimum print quality as follows:

SINGLE PART FORMS

A) Loosen and move penetration control knob as far forward as possible.

B) Tighten penetration control knob.

MULTI-PART FORMS

A) While manually moving print head across the page, increase penetration by moving knob forward until smudging occurs.

B) Back off on penetration just to the point of no smudging.

C) Tighten penetration control knob.

7. Ensure power switch on rear of printer is OFF and connect printer to desired input device via interface connector.

8. Set power switch to ON position and ensure POWER Lamp is lit. Depress PRINT switch to enable printer to receive data.

For the 26-1150 Line Printer, see Figure 6.

4

OPERATOR CONTROLS AND INDICATORS

The following table lists all the Line Printer controls and indicators, their location and function

CONTROL AND INDICATOR	LOCATION	FUNCTION
POWER switch	Right rear of printer	When set, applies power to printer circuits.
POWER lamp	Front control panel	When lit, indicates POWER switch is on and power applied.
PRINT switch	Front control panel	When set to on position, printer has unrestricted communication with interface. When set to off position while printing, printer continues printing line in buffer or complete control code received then stops.
Print Density Control	Center rear of printer	Adjusts horizontal character density over range of 10 characters/inch to 16.5 characters/inch.
Penetration Control Knob	Right side of print head carriage	Adjusts penetration of print wire to produce desired print quality.
Platen Knob	Right side of printer	When depressed and turned, manually adjusts vertical paper position in printer.

OPERATING NOTES

1. Always plug printer into a 3-wire grounded outlet.

2. Ensure that all covers are closed and secured during operation.

3. Never operate printer without paper.

4. Avoid leaning or placing objects on any part of printer. If an object accidently falls into the machine, turn power off and carefully remove object.

5. Turn power off before adjusting print head, replacing ribbon or loading paper.

6. Use only a lint-free cloth to clean printer surface. Do not use solvents or harsh cleaning agents. A mild detergent solution or desk top cleanser may be used sparingly.

PAPER SPECIFICATIONS

PINCH ROLL (26-1150)
Acceptable paper is single ply or two ply carbonless paper conforming to the following specifications:

A. PAPER WIDTH: 9.8" (250 mm) maximum.

B. ROLL DIAMETER: 6.67" (170 mm) maximum.

C. CORE DIAMETER: 1.0" (25 mm).

NOTE:
Replacement paper can be purchased through your local Radio Shack store.

TRACTOR FEED (26-1152)
Acceptable paper will be continuous form paper with standard feed holes on each edge, conforming to the following specifications:

A. PAPER WIDTH: 12.1 (307 mm) maximum

B. FORM LENGTH: 3" (76 mm) to 14" (355 mm). For optimum refold, a length of 11" (279 mm) is recommended.

C. FORM THICKNESS: 0.030" (0.76 mm) maximum.

D. PAPER WEIGHT:
Single Part Form 15 to 20 lbs.
Multiple Part Form Original — 12 to 15 lbs.
Copies — 9 to 12 lbs.
Last copy — 15 lbs. (maximum of 5 parts).

E. Carbon Paper 7 1/4 lbs. with medium hardness.

RIBBON SPECIFICATIONS

The printer uses a 180° mobius loop configuration that allows printing on the upper and the lower position of the ribbon on alternate passes. The ribbon specifications are as follows:

LENGTH: Spool 30' ±6" (9.1 m ±15.25 cm).

WIDTH: 9/16" ±1/64" (14.3 mm ±5 mm).

THICKNESS: .004" ±.00025" (0.1 mm ±.0064 mm).

The available ribbon color is black. You can order ribbon through your local Radio Shack store.

RIBBON REPLACEMENT

To replace the spool ribbon, refer to Figure 3 and perform the following steps:

1. Set POWER switch to OFF position.

2. Open ribbon cartridge cover.

3. Open ribbon rollers by turning ribbon roller lever 90° in either direction. Place a finger behind the latch on the ribbon cartridge cover and apply a small amount of pressure to release. Then, swing the hinged cover upward.

4. Back off the penetration control knob and remove the old ribbon.

5. Place ribbon in cartridge and unwind enough ribbon to loop around print head. Pass one end of loop through ribbon rollers and other end through rear slot.

6. Close ribbon rollers by returning lever to center position and close cartridge cover.

7. Feed ribbon into slotted guide in front of head and ensure ribbon does not bind.

8. Feed other end through rear guide and ensure twist is located between left hand rear guide and rear of ribbon cartridge.

9. Take up slack by rotating ribbon drive shaft clockwise and readjust penetration control knob.
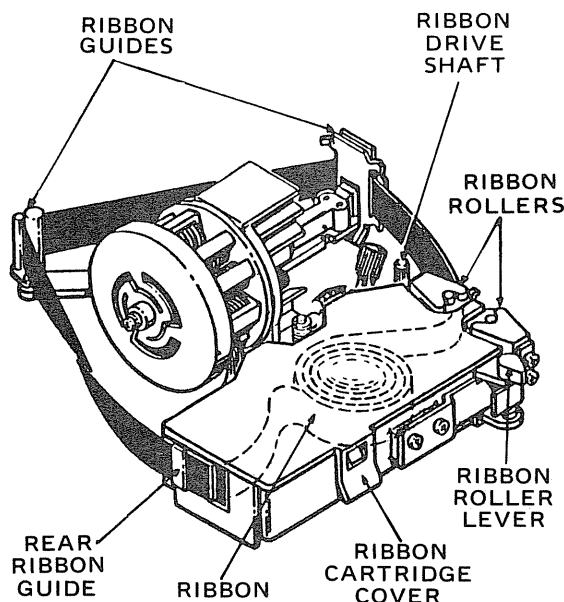
To replace the zip pack ribbon, refer to Figure 4 and perform the following steps:

1. Set the POWER switch to the OFF position.

2. Open the ribbon cartridge cover.

3. Open the ribbon rollers by turning the ribbon roller lever 90° in either direction. Place a finger behind the latch on the ribbon cartridge cover and apply a small amount of pressure to release the hinged cover and swing it upward.

4. Back off the penetration control knob and remove the old ribbon.

5. Place the zip package in the cartridge with the shell side up and thread one end of the exposed ribbon loop through the front rollers and the other end through the rear slot.

6. Close the ribbon rollers by returning the ribbon lever to the center position.

7. To remove the wrapper, hold the package against the rollers and pull the tab.

8. Hold the stripper down (it is a flat piece of cardboard that is located under the hole in the shell) and remove the shell from the cartridge.

9. Now remove the stripper from the cartridge and close the cover.

10. Thread the ribbon through the front and rear ribbon guides on the print head.

11. Take up the slack by rotating the ribbon drive shaft clockwise and readjust the penetration control knob.
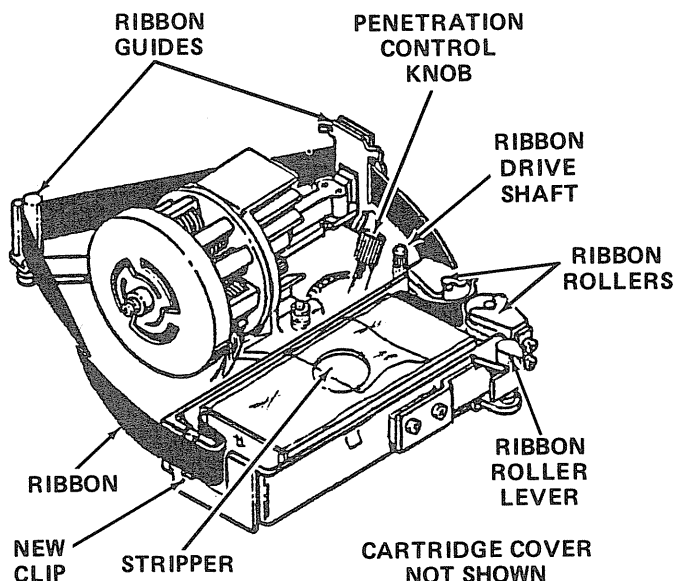

FIGURE 3. SPOOL RIBBON REPLACEMENT

FIGURE 4. ZIP PACK RIBBON REPLACEMENT

PENETRATION CONTROL KNOB

The head penetration control on the right side of the print head controls the clearance between the face of the print head and the platen. This clearance must be adjusted according to the thickness of the forms being used (refer to Figure 4).

To adjust the print head for optimum print quality, turn the power off and perform the following steps:

1. Loosen the penetration control knob (turn counterclockwise) on the right side of the print head.

2. For single part paper, increase the head penetration by pushing the knob all the way forward. For multipart paper, increase the penetration by pushing the knob forward slightly.

3. Manually move the print head across the paper to see if the ribbon binds.

4. If the ribbon binds, pull the penetration knob back just enough to prevent binding.

5. Tighten the control knob (turn clockwise) to secure the carriage.

LOADING PAPER

TRACTOR FEED (26-1152)

Before loading paper into the printer, turn the power off and remove the cover, then perform the following:

1. Refer to Figure 5B and release the tractor feed locking levers on the left and right pin feed tractors.

2. For rear paper feed, refer to Figure 5A and tilt the tractor feed unit back so that the feed pins are facing up.

3. Open the left and right paper guides.

4. From the rear of the printer, feed the paper underneath the tractor unit and up into the pin feed tractors.

5. Slide the pin feed tractors to accommodate the paper width. Ensure that the paper holes are aligned so that the top of the sheet is parallel with the top of the printer.

6. Close the paper guides and swing the tractor unit forward and down.

7. Feed the paper under the platen. Depress and turn the platen knob until the paper comes up and over the platen to the top of the pin feed tractors, as in Figure 5A.

8. Referring to Figure 5C, open the paper guides and align the paper so that the top of the sheet is parallel with the top of the printer.

9. The first character will print below the number "1" of the graduated scale on the tear bar. Adjust the pin feed tractors so that the first character will print in the desired column on the paper.

10. When the pin feed tractors are properly adjusted, secure the tractor feed locking levers and close the paper guides.

11. Adjust the paper tension with the tensioner wheel, replace the cover and turn on the power.

12. For bottom paper feed, feed the paper through the slot in the bottom of the printer in front of the platen.

13. Release the tractor feed locking levers on the left and right pin feed tractors.

14. Adjust the pin feed tractors to accommodate the paper width then repeat steps 8 through 11.
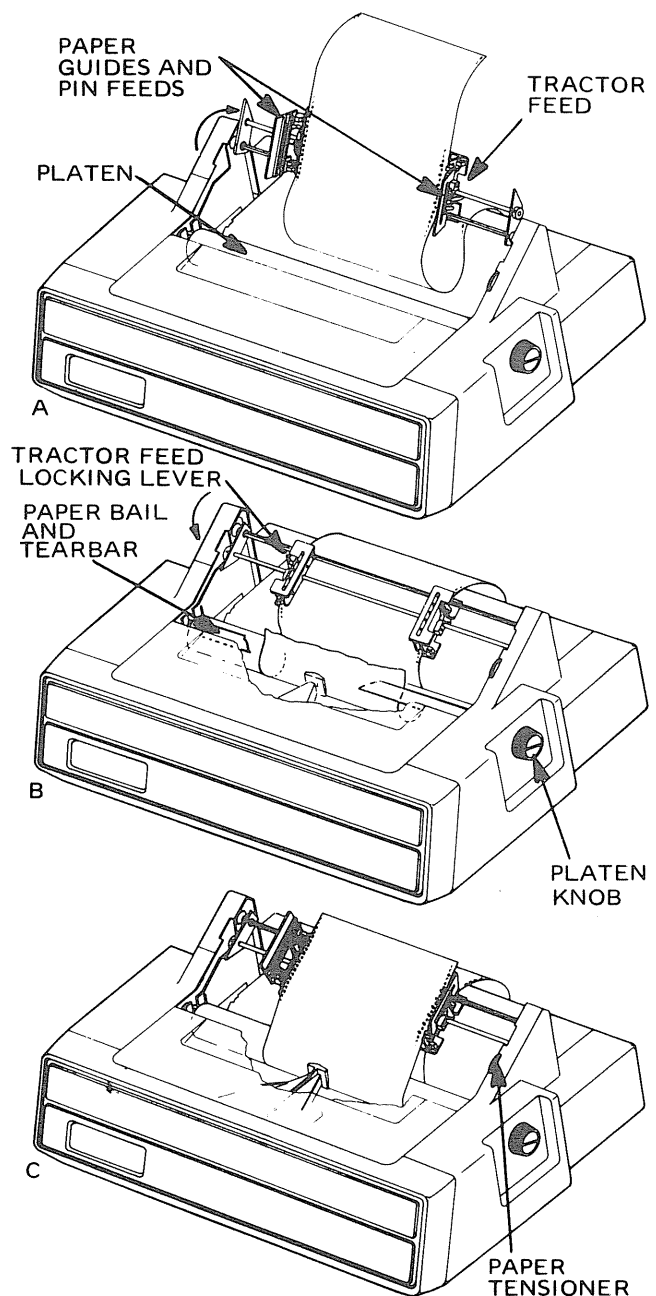

FIGURE 5. LOADING FAN FORM PAPER

PINCH ROLL (26-1150)

To load pinch roll paper, refer to Figure 6 and perform the following steps:

1. Ensure power is off and remove the clear plastic cover.

2. Remove rubber "O" ring from one end of paper mounting bar and insert bar into 9.8" roll paper.

3. Slide rubber "O" ring onto bar to secure paper roll in place then mount paper and bar onto holder so that paper feeds from bottom of roll as shown.

NOTE: It may be easier to load the paper with the print head all the way to the right.

4. Feed paper from bottom of roll over paper tensioner bar then behind and under platen.

5. Depress and turn platen knob until paper comes up between platen and paper bail.

6. Replace clear plastic cover, turn power on, depress print switch and printer is ready to print.
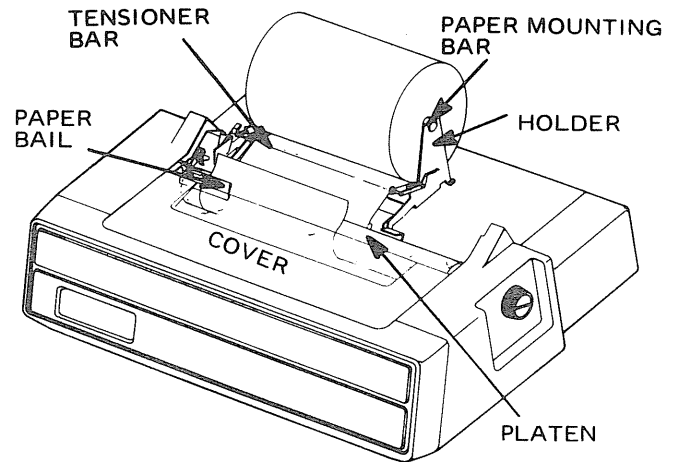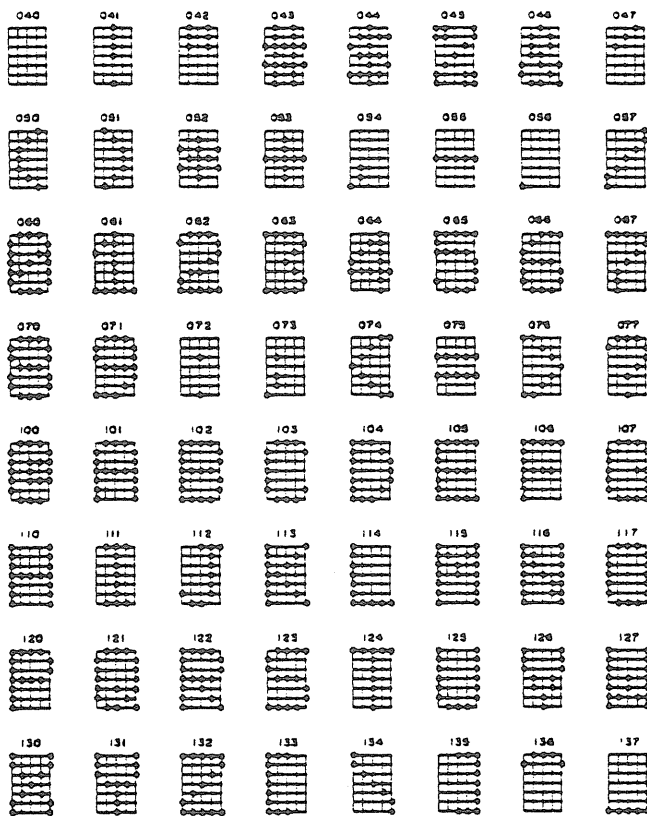

FIGURE 6. LOADING PINCH ROLL PAPER FEED

OPERATING CHECKS

If printer does not operate properly, check the following table for possible sources of error before calling for service.

SYMPTOM	ACTION
Printer does not print with POWER switch in on position.	Check power cord at rear of printer and ensure that PRINT switch is depressed. Check paper empty switch arm at left rear of paper roll.
Printer stops printing before paper runs out.	Check if paper empty switch arm is bent.
Ink ribbon tracking problem.	Ensure ribbon is installed as outlined in ribbon replacement procedure.
Poor print quality (e.g. smudging or light print)	Adjust head penetration as outlined in forms thickness control procedure.

STANDARD CHARACTER SET

STANDARD 5 x 7 CHARACTER MATRIX

USASCII CODE

Note: [ ] Indicates control codes recognized by the Line Printer.

b4 ↓	b3 ↓	b2 ↓	b1 ↓	Column / Row	0 $^{0}0_{0}$	1 $^{0}0_{1}$	2 $^{0}1_{0}$	3 $^{0}1_{1}$	4 $^{1}0_{0}$	5 $^{1}0_{1}$
0	0	0	0	0	NUL	DLE	SP	0	@	P
0	0	0	1	1	SOH	DC1	!	1	A	Q
0	0	1	0	2	STX	DC2	"	2	B	R
0	0	1	1	3	ETX	DC3	=	3	C	S
0	1	0	0	4	EOT	DC4	$	4	D	T
0	1	0	1	5	ENQ	NAK	%	5	E	U
0	1	1	0	6	ACK	SYN	&	6	F	V
0	1	1	1	7	BEL	ETB	'	7	G	W
1	0	0	0	8	BS	CAN	(	8	H	X
1	0	0	1	9	HT	EM	)	9	I	Y
1	0	1	0	10	LF	SUB	*	:	J	Z
1	0	1	1	11	VT	ESC	+	;	K	[
1	1	0	0	12	FF	FS	,	<	L	\
1	1	0	1	13	CR	GS	-	=	M	]
1	1	1	0	14	SO	RS	.	>	N	^
1	1	1	1	15	SI	US	/	?	O	_

CONTROL CODES   STANDARD

9

SOFTWARE CONTROL OF THE LINE PRINTER

You can instruct the Printer to execute a Line Feed/Carriage Return and a Top of Form command by using the following control codes as arguments in the CHR$ function.

Function	Control Codes (decimal)
Line Feed/Carriage Return	10 or 13
Top of Form	11 or 12

A Line Feed/Carriage Return command will be ignored if it is the first or last item in an LPRINT list. But a Top of Form command should always be the first item in the LPRINT list. Any preceding items will be ignored.

Examples:

    LPRINT CHR$ (11) ; "TOP OF FORM"

    LPRINT "LINE ONE" ; CHR$ (10) ; "LINE TWO" ; CHR$ (10) ; "LINE THREE"

SPECIAL PROGRAMMING NOTE:

When the Print Head reaches its mechanical stop point at the right edge of the platen, a forced Line Feed/Carriage Return occurs. Any data remaining in the 132-character print buffer will be lost.

For example,

LPRINT 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18

will cause the Computer to print the numbers on a single line until the Print Head reaches its mechanical stop point. It will then execute a Line Feed/Carriage Return and any characters remaining in the print buffer will be lost.

The maximum number of characters per line depends on how you've set the print density control (on the rear of the Line Printer next to the Serial Plate). If the density is set to maximum, the Print Head will never reach its mechanical stop point. The Line Printer will simply print out the entire contents of the 132-character buffer, execute an automatic Line Feed/Carriage Return and continue if more data is sent to the buffer. No data will be lost.

However, the characters are rather small with the print density set to maximum. A more readable setting will allow around 100 characters (including blanks) to be printed before a mechanically forced Line Feed/Carriage Return occurs.

To avoid losing data due to a mechanically forced Line Feed/Carriage Return:

1. Determine the maximum number of characters that can be printed using the desired print density.

2. Don't print out lines whose lengths exceed this number. Also watch out for trailing commas or semi-colons at the end of an LPRINT list; these may cause you to lose data on subsequent LPRINT statements.

3. If you want to use a long LPRINT list, then imbed carriage returns in the list to force a carriage return without losing data.

    Example:

    LPRINT A,B,C,D,E ; CHR$ (10) ; F,G,H,I,J ; CHR$ (10) ; K,L,M,N,O

    will print out three lines with five items per line.

LIMITED WARRANTY

Radio Shack warrants for a period of 90 days from the date of delivery to customer that the computer hardware described herein shall be free from defects in material and workmanship under normal use and service. This warranty shall be void if the computer case or cabinet is opened or if the unit is altered or modified. During this period, if a defect should occur, the product must be returned to a Radio Shack store or dealer for repair. Customer's sole and exclusive remedy in the event of defect is expressly limited to the correction of the defect by adjustment, repair or replacement at Radio Shack's election and sole expense, except there shall be no obligation to replace or repair items which by their nature are expendable. No representation or other affirmation of fact, including but not limited to statements regarding capacity, suitability for use, or performance of the equipment, shall be or be deemed to be a warranty or representation by Radio Shack, for any purpose, nor give rise to any liability or obligation of Radio Shack whatsoever.

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